

Effect of recreational handball on sleep, well-being and psychological characteristics in untrained males

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To Cite:

Tomar R, Allen JA. Effect of recreational handball on sleep, well-being and psychological characteristics in untrained males. Medical Science, 2021, 25(117), 2804-2812

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Peer-Review History

Received: 20 September 2021
Reviewed & Revised: 22/September/2021 to 26/October/2021
Accepted: 28 October 2021
Published: November 2021

Peer-review Method

External peer-review was done through double-blind method.

ABSTRACT

Aim of present study was to examine the effects of small sided recreational handball on depression, self-esteem, eating disorder, motivation to exercise, sleep and general well-being in untrained males. We randomized 24 students into two groups: intervention group (n=14) and control group (n=10). Participants in intervention group play small sided handball for 12 weeks. Control group followed their normal routine. Following questionnaires were used; PHQ-9 (depression); Pittsburgh Sleep Quality Index (sleep); EDE-Q (eating disorders); WHO-5 (well-being); BREQ-2 (motivational). Statistical analysis was done using T test to check group differences. Results showed significant difference in scores of depressions ($t_{22} = 3.882$, $P = 0.001$), self-esteem ($t_{22} = 2.118$, $P = 0.046$) and eating disorders ($t_{22} = 4.457$, $P = 0.000$). We did not find any significant difference in amotivation ($t_{22} = 1.051$, $P = 0.304$), external regulation ($t_{22} = 0.675$, $P = 0.507$), introjected regulation ($t_{22} = 0.653$, $P = 0.521$), identified regulation ($t_{22} = 1.077$, $P = 0.293$) and intrinsic regulation ($t_{22} = .485$, $P = 0.633$). There was improvement in sleep quality ($t_{22} = 3.776$, $P = 0.001$) and general well-being of participants ($t_{22} = 2.559$, $P = 0.018$) post intervention. It was concluded that small sided recreational handball was effective in reducing symptoms of depression. Contrary to popular belief we could not find any improvement in motivation to exercise, but there was notable improvement in self-esteem of participants. It was interesting to see improvement in both general well-being and sleep quality post intervention.

Keywords: Recreational Handball, Eating Disorder, Depression, Sleep, Self Esteem

1. INTRODUCTION

Handball is body contact game well known for efforts such as sprints, jumps and quick stops. It would be useful to know if recreational handball without specialized physical fitness training will contribute in improving stated objectives of the study. There was wide acceptance of sports participation as a promoter of healthy lifestyle (Haskell et al., 2007). Participant in sports increases self-esteem (Steptoe and Butler, 1996), and thereby it helps in enhancing peer acceptance (Weiss and Duncan, 1992). Participation in sports



is linked positively to psychological development (Fraser-Thomas et al., 2005). Furthermore, participation in sports has an impact upon self-esteem which is being reported widely in available scientific literature. A positive correlation can be seen between self-esteem, perceived sport competence and sports participation in adolescents (Wagnsson et al., 2014).

Depression is increasing in youth. A per data from Mental Health America, in the youth it has increased from 5.9% in 2012 to 8.2% in 2015 and from this around 76% youth didn't get sufficient treatment. Therefore sports, especially team sports become important to counter and handle depression among youth. Participation in team sports gives youngsters an outlet outside of school and home, in order to release their frustration, anger, anxiety or depression which otherwise they might not know how to handle (Badura et al., 2015). We are of belief that recreational handball as form of exercise may have great potential to reach out to inactive youth population in Saudi Arabia.

According to World Health Organization, 58.5% of adult population in Saudi Arabia was considered to be physically inactive (WHO, 2016). Furthermore, it is estimated that in Saudi Arabia, number of children (57%) and youths (71%) were physically inactive (Haskell et al., 2007). Over all as per the national survey, 60% of population in Saudi Arabia is physically inactive (Ministry of Health, 2013). Another survey shows that, prevalence of physical activity is quite low among men (6.1%) and women (1.9%) in Saudi Arabia (Mabry et al., 2016). Lack of motivation is found to be one of the causes for not exercising more frequently (European Commission, 2014). Considering above data and information, it is imperative to find novel modes of exercise which can stimulate behavioral changes in youth.

Many studies were done in the past to study the effect of recreation football or recreation on healthy male and female subjects. Not many studies have been done on recreational handball. Especially in this part of world where climate is a big challenge for outdoor activities, we would like to see if small sided games of recreation basketball can have a positive effect on health parameters. Therefore, we would like investigate the effects of small sided recreational handball on depression, self-esteem, eating disorder, motivation to exercise, sleep and general well-being.

2. METHODS

Participants

Participants were untrained male residing in campus of King Fahd University of Petroleum & Minerals. Total 24 participants, all males, were selected randomly following exclusion criteria. They were fully informed about the risk and written consent was obtained. This study was approved by Research Committee of King Fahd University of Petroleum and Minerals (Approval Code number IN191046, 29 March, 2020). Exclusion criteria was; participants involved in regular physical activities with in previous one year; who were playing regular handball; participants on medications and suffering from cardiovascular diseases or obesity. Duration of the study period was from April 2020 to September 2021.

Study Design and Intervention

Two groups were formed to study the effects recreational handball on selected psychological and health parameters. Group one was intervention with 14 participants. Group two was control with 10 subjects. Subjects were assessed and tested at baseline level and at the end of 12 week of intervention. Participants were advised not to involve in any other physical activities during the period of 12-week intervention. Twelve weeks of supervised small sided recreational handball was given to the participants in intervention group. There were total four teams. Each team consists of 4 players instead of regular seven. All games were played on handball court measuring 40x30m. All sessions were organized during evening hours. Frequency of sessions was twice a week for 30 minutes. Participants did warm up for 10 minutes which consists of jogging and handball drills. After finishing of each session participants performed cooling down exercise for 10 minutes. All the training sessions were supervised personally by the research team. No specific coaching instructions were given to the participants by the investigators. Heart rate of all the participants was measured continuously during all the handball sessions using heart rate monitors.

Measurements and Testing Protocols

Depression and Self Esteem

PHQ-9 self-reported depression scale was used to examine depression (Spitzer et al., 1999) which consists of 9 questions to assess depression. Respondents have to answer on a Likert scale from 0 to 3. Overall score was from 0 to 27. High score indicates severity of depression.

Rosenberg Self-Esteem Scale is a 10-item tool to measure self-esteem (SES, Rosenberg, 1965). Participants have to record response on a scale indicating their choice from 'strongly agree' to 'strongly disagree'. Range of the obtained score is 0-30, if an individual achieved high scores; it is an indicator of high self-esteem.

Motivation to Exercise and Eating Disorder

A Self-reported Behavioral Regulation in Exercise Questionnaire (BREQ-2) (Markland & Tobin, 2004) is 19 item tool that can to assess motivation to exercise. BREQ-2 consists of subscale to assess motivation.

The Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn and Beglin, 2008) was used to measure eating disorders among obese students. It was a self-report instrument containing 28 items, and is meant to assess eating disorders from an attitude and behavioral aspects over a period of 28-days. The EDE-Q consists of 4 subscales; Restraint (5); Shaping Concern (8); Weight Concern (5) and Eating Concern (5). The average of each subscale score was recorded and average of all four subscales considered as global EDE-Q score.

Sleep and Well Being

Sleep Index Pittsburgh Sleep Quality Index, a 19-item questionnaire was used to measure sleep quality (Buysse et al., 1989). It consists of 7 components and scores from these components were added to get global score (0-21). A high score is an indicative of worse sleep quality.

A short self-reported well-being questionnaire (WHO-5) was used to measure well-being of participants. There were five statements in WHO-5. The maximum raw score can be 25 which have a range from 0 to 25, and multiply this raw score with 4 gives the final score. Score of 0 represents the worst well-being whereas score of 100 is indicative of best well-being (WHO, 1998)

Statistical Analysis

Collected data were presented as means and standard deviation. All data were assessed for normality by using Shapiro Wilks test. Baseline measurements were checked for any group differences before intervention using T Test. In addition, between groups differences in delta values (post minus pre-values) were tested by T Test. P-value was set at 0.05.

3. RESULTS

Participant's mean age was 19.78 ± 1.05 years and 19.60 ± 0.96 years in intervention and control groups ($P = 0.664$) respectively. No adverse complications were reported. There were no significant differences at baseline between two groups (Table 1).

Table 1 Descriptive Statistics: Comparison at Baseline between Intervention and Control Group (Independent t Test)

Variable	Intervention Group (n=14)		Control Group (n=10)		P Value
	Baseline	12 Week	Baseline	12 Week	
Depression	6.35 \pm 1.82	4.64 \pm 1.82	6.6 \pm 1.71	8.8 \pm 2.48	0.745
Self Esteem	21.5 \pm 3.00	24.21 \pm 3.09	20.2 \pm 4.96	20.6 \pm 5.56	0.432
Amotivation	0.92 \pm 0.82	1.5 \pm 1.5	0.70 \pm 1.05	0.6 \pm 1.07	0.559
External Regulation	1.35 \pm 0.84	2.14 \pm 2.14	1.5 \pm 1.71	1.8 \pm 1.75	0.789
Introjected Regulation	6.07 \pm 2.64	7.07 \pm 2.58	5.8 \pm 1.54	6.2 \pm 2.29	0.775
Identified Regulation	10.64 \pm 1.98	10.57 \pm 2.34	11.9 \pm 2.37	10.6 \pm 4.19	0.173
Intrinsic Regulation	12.92 \pm 2.49	13 \pm 1.7	12.8 \pm 2.85	12.4 \pm 2.54	0.908
Sleep	10.85 \pm 1.87	9.28 \pm 10.5	10.2 \pm 1.68	10.5 \pm 2.12	0.388
Well Being	12.07 \pm 4.30	12.8 \pm 4.26	12.6 \pm 4.42	12.8 \pm 4.26	0.772
EDE-Q Global Score	2.35 \pm 0.79	2.27 \pm 0.76	2.65 \pm 1.04	2.86 \pm 0.83	0.439
Restraint Subscale	1.8 \pm 1.09	1.84 \pm 1.01	2.2 \pm 2.02	2.32 \pm 1.81	0.537
Eating Concern Sub Scale	1.57 \pm 1.16	1.48 \pm 1.05	1.3 \pm 0.94	1.58 \pm 0.92	0.550
Shaping Concern Subscale	3.1 \pm 1.37	2.96 \pm 1.31	3.46 \pm 1.49	3.66 \pm 1.24	0.553
Weight Concern Subscale	2.5 \pm 0.98	2.38 \pm 0.95	3.16 \pm 1.36	3.4 \pm 1.2	0.183

Data shown as Means \pm SD, *significant difference at .05

Handball Sessions

From initial 26 participants, two participants withdraw from the intervention (small side handball) during the study period. Two participants in control group did not appear for post measurements. All participants were able to play vigorous game of small sided handball (Mean Average heart rate 168.32 ± 8.60 beats/ minute) for 30 minutes duration (Mean duration of play 28.09 ± 2.63 minutes). Mean Attendance in the intervention group during study period was 94.64% which shows the enthusiasm and interest of participants in recreational handball (Table 2).

Table 2 General Characteristics of Participants

	Intervention Group (N=14)	Control Group (N=10)
Age (years)	19.78 ± 1.05	19.60 ± 0.96
Height (m)	1.71 ± 0.04	1.73 ± 0.03
Weight (kg)	70.16 ± 12.58	64.36 ± 10.94
BMI (kg/m^2)	23.76 ± 4.27	21.43 ± 3.28
Average Heart Rate (b/m)	168.32 ± 8.60	
Maximum Heart Rate (b/m)	191.68 ± 6.33	
Playing Time (min)	28.09 ± 2.63	
Attendance (%)	94.64	

Data shown as Means \pm SD and %

Depression, Self Esteem and Eating Disorder

We observed significant difference in depression. T Test revealed significant difference in depression ($t_{22} = 3.882$, $P = 0.001$), with mean depression score of 4.64 ± 1.82 and 8.8 ± 2.48 in intervention group (IG) and control group (CG) respectively. In self-esteem also, significant difference was seen in between two groups after intervention ($t_{22} = 2.118$, $P = 0.046$), where mean self-esteem score was 24.21 ± 3.09 and 20.6 ± 5.56 in IG and CG respectively (Table 3, Fig 1, Fig, 2).

Table 3 Comparison of Psychological Parameters after 12 weeks (Difference between Post and Pre-Scores, Independent t Test)

Variable	Intervention Group (n=14)	Control Group (n=10)	P Value
Depression	1.71 ± 1.54	-2.2 ± 3.32	0.001*
Self Esteem	2.71 ± 1.97	0.4 ± 3.37	0.046*
Amotivation	0.57 ± 1.5	-1 ± 1.59	0.304
External Regulation	0.78 ± 1.96	0.3 ± 1.33	0.507
Introjected Regulation	1 ± 2.14	0.4 ± 2.31	0.521
Identified Regulation	-0.7 ± 2.16	-1.3 ± 3.4	0.293
Intrinsic Regulation	0.7 ± 2.55	-0.4 ± 2.01	0.633
Sleep	1.57 ± 0.93	-0.3 ± 1.49	0.001*
Well Being	1.64 ± 1.54	0.2 ± 1.03	0.018*
EDE-Q Global Score	0.08 ± 0.07	-0.2 ± 0.22	0.000*
Restraint Subscale	-0.04 ± 0.16	-0.12 ± 0.36	0.490
Eating Concern Sub Scale	0.08 ± 0.17	-0.28 ± 0.3	0.001*
Shaping Concern Subscale	0.14 ± 0.14	0.2 ± 0.33	0.002*
Weight Concern Subscale	0.11 ± 0.21	-0.24 ± 0.24	0.001*

Data shown as Means \pm SD, *significant difference at .05

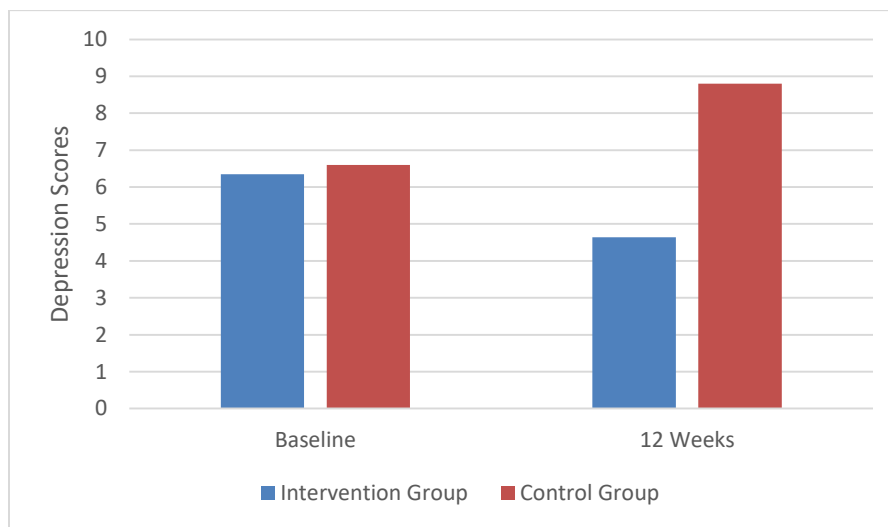


Figure 1 Mean Depression Scores in Study Groups

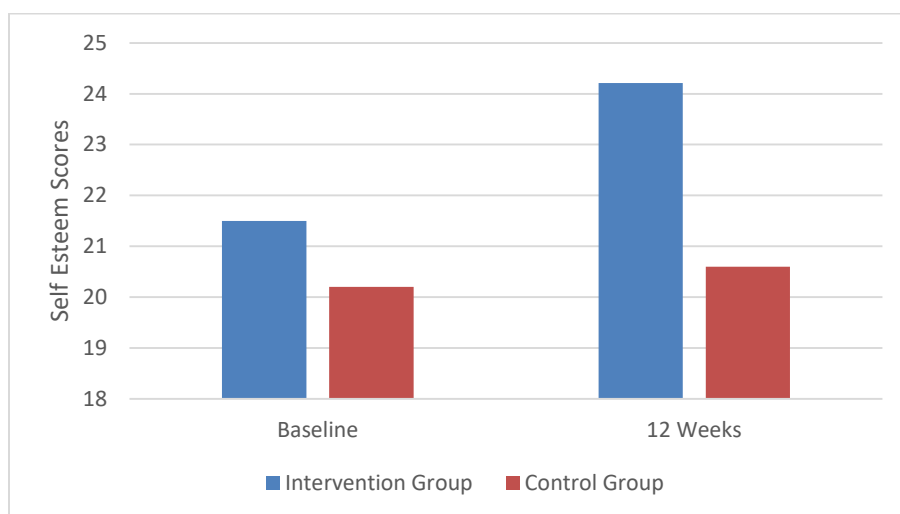


Figure 2 Mean Self Esteem Scores in Study Groups

Significant difference was in EDE-Q global score between two groups. T Test revealed significant difference in EDE-Q global Score ($t_{22} = 4.457$, $P = 0.000$). No difference was seen in Restraint subscale ($t_{22} = 0.702$, $P = 0.490$). Remaining three subscales have shown significant difference post intervention between two groups, Eating Concern ($t_{22} = 3.793$, $P = 0.001$); Shaping concern ($t_{22} = 3.429$, $P = 0.002$) and Weight concern ($t_{22} = 3.725$, $P = 0.001$).

Motivation to Exercise

With regard to motivation to exercise, no significant difference observed post intervention between two study groups. None of the sub scale BREQ-2 had shown significant improvement. Amotivation ($t_{22} = 1.051$, $P = 0.304$), where mean amotivation was 1.5 ± 1.5 and 0.6 ± 1.07 in IG and CG respectively. External regulation ($t_{22} = 0.675$, $P = 0.507$), where mean external regulation was 2.14 ± 2.14 and 1.8 ± 1.75 in IG and CG respectively. Introjected regulation ($t_{22} = 0.653$, $P = 0.521$), where mean introjected regulation was 7.07 ± 2.58 and 6.2 ± 2.29 in IG and CG respectively. Identified regulation ($t_{22} = 1.077$, $P = 0.293$), where mean identified regulation was 10.57 ± 2.34 and 10.6 ± 4.19 in IG and CG respectively. Intrinsic regulation ($t_{22} = .485$, $P = 0.633$), where mean intrinsic regulation was 13 ± 1.7 and 10.5 ± 2.12 in IG and CG respectively.

Sleep and Well Being

We found significant difference on sleep quality between two groups after intervention ($t_{22} = 3.776$, $P = 0.001$), where mean sleep score was 9.28 ± 10.5 and 10.5 ± 2.12 in IG and CG respectively. Significant difference was also seen in well-being scores between two groups after intervention ($t_{22} = 2.559$, $P = 0.018$), where mean well-being score was 12.8 ± 4.26 and 12.8 ± 4.26 in IG and CG respectively (Fig.3, Fig.4).

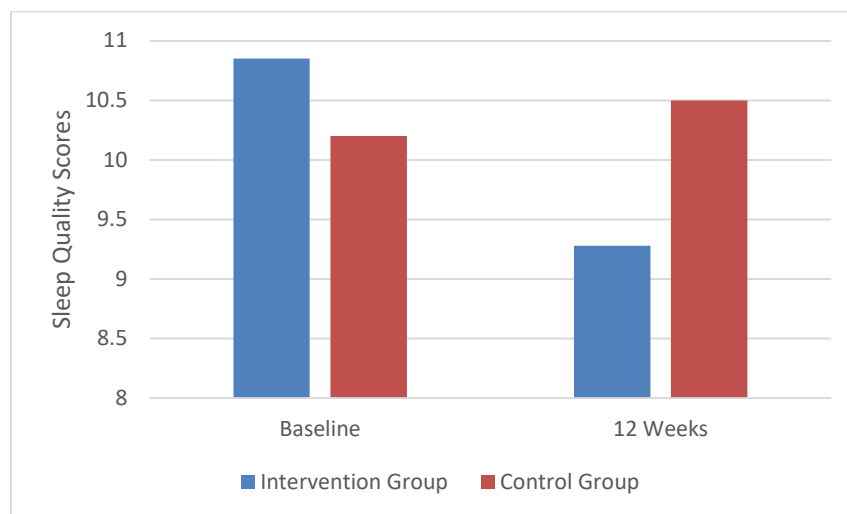


Figure 3 Mean Sleep Quality Scores in Study Groups

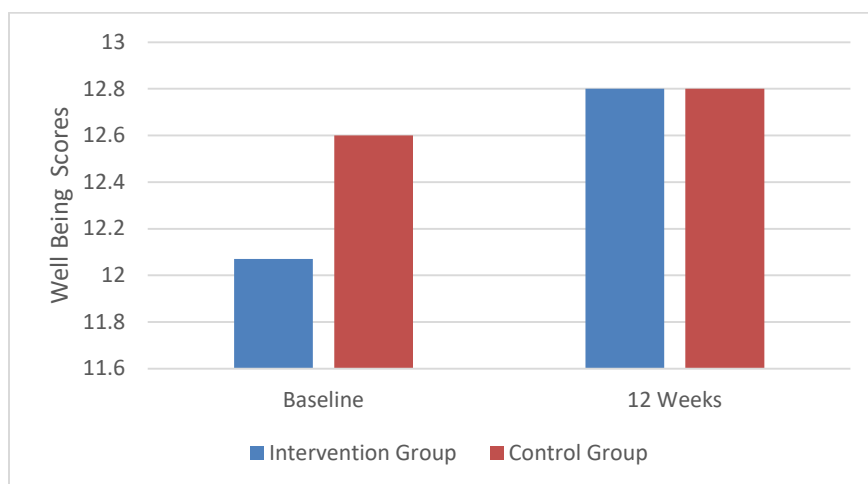


Figure 4 Mean Well Being Scores in Study Groups

4. DISCUSSION

Findings of present study revealed mixed results, where on one hand there was significant improvement in depression and self-esteem, sleep and well-being parameters of the participants, whereas on other hand there was no significant improvement was seen in motivation to exercise, which was quite contrasting results. We choose convenience sampling, as we had selected participants randomly from whoever was available on the campus during summer. It was always difficult to carry out studies involving youth with lot of academic pressure and commitments, and results must be interpreted with care considering limitation of study design. One of the strongest points of study was attendance of participants which 91.66% which shows enthusiasm and interest in small sided handball game. This was also supported by previous study which stated that university students are more likely to appear and participate in physical activities which are social in nature and not carried in structured settings (Bruke et al., 2005). Our data and finding also suggest that recreational exercise or sports can give same or at least few of the beneficial effects as that of structured exercise which was also retreated by another study (Tomar and Antony, 2019; Tomar and Antony, 2019a).

Depression, Self Esteem and Eating Disorders

We observed improvement in depression symptoms in intervention group after the 12 weeks of recreational basketball. Although there are many studies which examined depression in basketball players but there was hardly any study which investigated effects of recreational handball on untrained males. According to previous studies, it was reported in clinical populations that, exercise helps to reduce the severity of depression (Brosse et al., 2002; Craft, 2005; Lawlor and Hopker, 2001; Paluska and Schwenk, 2000). Another confirmed the decrease in symptoms of depression in intervention group (Zarshenas et al., 2013). Reduction in risk of depression was reported as a result of 10-week supervised exercise in sedentary employees with inactive lifestyle and having high-

risk of depression (Zeeuw et al., 2010). Aqua aerobics help develop positive attitude and reduce depression levels (Kim et al., 2015). A study by Tomar & Allen (2016) also confirms reduction of depression symptoms after 12 weeks of exercise intervention at the work place. We found positive effect of recreational handball on self-esteem of participants. Our result was in line with earlier studies that supports improvement in self-esteem as result of sports participation (McHale et al., 2005; Weiler, 1998; Davis and Fox, 1993; Richman and Shaffer, 2000; Antony and Tomar, 2016). Another study on recreational programmes including basketball has also shown significant improvement in self-esteem after 10 weeks of intervention (Bayazit, 2014). There was positive effect seen on self-esteem and problem-solving skills in the students at university as a result of recreational physical activities (Yiğiter and Bayazit, 2013). We have observed higher self-esteem score and lower depression values after 12 weeks in intervention group. It's worthwhile to note here that psychologically healthy people possess high self-esteem (Branden, 1994) comparing to those psychologically depressed who possess low self-esteem (Tennen and Affleck, 1993).

Twelve-week intervention was found to be effective on eating disorders. Intervention group had shown improvement in eating disorders scores post intervention along with its subscales, eating concern, shaping concern and weight concern. Literature suggests that patients with eating disorder have shown high levels physical activity (Melissa et al., 2020).

Motivation to Exercise

We did not find any significant difference in motivation to exercise between two groups. Our findings were contrary to the belief that sports participation improves motivation towards exercise. We have seen increase in amotivation, external regulation and introjected regulation score in the intervention group after 12 weeks of intervention, while there was marginal increase in identified and intrinsic regulation scores. Previous study suggests that with regard to motives, sport participation was more desired exercise (Kilpatrick et al., 2005). Higher scores of intrinsic regulations and identified regulation show greater intrinsic motivation (Deci & Ryan, 1985). Another study on university graduate suggests students were motivated to take up physical activity for improvement in competence and for enjoyment (Antony and Tomar, 2015). We did not see significant improvement in motivation to exercise in present study. Participant's mood and state of mental condition during that period might affect perceptions while answering questions in the surveys. It was interesting to note that in our study participant's attendance (94.64%) which was quite encouraging.

Sleep and Well Being

We find highly significant improvement in sleep quality post intervention in intervention group. Reduced sleep might be a factor which can affect mood, motor and other cognitive functions in young athletes that can increase the risk of injuries (Goel et al., 2009; Philip et al., 2004). It is a well-established fact that sleep deprivation can alter mood (Oginska and Pokorski, 2006). Both quality and quantity of sleep can be improved through physical activity if performed systematically and regularly (Badicu, 2018). Previous study did not find significant difference in sleep quality in physical activity group. It appears that sleep and physical activity have bidirectional relationship (Semplonius and Willoughby, 2018).

Our results indicate improvement in well-being of participants. Our data is supported by previous study where there was evidence that suggest positive effects on well-being of adolescents as a result of high intensity aerobic exercise (Norris et al., 1992). Intensity in our study was also quite high. For enhancement of well-being, it is recommended to have exercise in playful form when compare to competitive form of exercise (Jetzke and Mutz, 2020). There are few take away points from the present study. Firstly, intervention was given only 2 days per week with gap of three days. Secondly duration of basketball playing was only for 30 minutes in each session. Our results should be interpreted in mind other studies on recreational sports where training was imparted for 3 more days in a week and duration of session was also more than 30 minutes could have some bearing on results.

5. CONCLUSION

Recreational handball played only for two days in a week have shown favorable reduction in symptoms of depression among participants following 12 weeks of recreational handball. Our programme was not effective in improving motivation towards exercise but there is significant increase in self-esteem of participants along with significant decrease in eating disorder. Sleep quality and well-being of participants was also improved with intervention. Present study, recreational handball can be encouraged as an alternate activity for health improvement among untrained males. There is general consensus with regard to health benefits of physical activity but data regarding recreation activities and sports participation is limited. Current study may help to further add to the existing knowledge but due to a peculiar educational setting in which data was collected, it won't be proper to generalize the results.

Acknowledgment

"The author(s) would like to acknowledge the support provided by the Deanship of Scientific Research (DSR) at King Fahd University of Petroleum & Minerals (KFUPM) for funding this work through project No. SB191046."

Authors Contribution

Rakesh Tomar - Principal Investigator, Study design, Data collection, Statistical analysis, Manuscript Preparation

John Ainsworth Allen - Co-Investigator, Study design, Data collection, Statistical analysis, Manuscript Preparation

Conflict of Interest: Authors here by declare that they have no conflict of interest.

Funding

This project was funded by Deanship of Scientific Research at King Fahd University of Petroleum & Minerals (Grant Number SB191046).

Data Availability

The data used during the current study are available from the corresponding author on request.

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